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Amazon under threat from cleaner air

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The Amazon rainforest, so crucial to the Earth's climate system, is coming under threat from cleaner air say prominent UK and Brazilian climate scientists in the leading scientific journal *Nature*.

The new study identifies a link between reducing sulphur dioxide emissions from burning coal and increasing sea-surface temperatures in the tropical north Atlantic, resulting in a heightened risk of drought in the Amazon rainforest.

The Amazon rainforest contains about one tenth of the total carbon stored in land ecosystems and recycles a large fraction of the rainfall that falls upon it. So any major change to its vegetation, brought about by events like deforestation or drought, has an impact on the global climate system.

A team from the University of Exeter, Centre for Ecology and Hydrology (CEH), Met Office Hadley Centre and Brazilian National Institute for Space Research used the Met Office Hadley Centre climate-carbon model to simulate the impacts of twenty-first century climate change on the Amazon rainforest. They compared the model to data from the 2005 drought, which caused widespread devastation across the Amazon basin. The researchers estimate that by 2025 a drought on this scale could happen every other year and by 2060 a drought could occur in nine out of every ten years.

Co-author Dr Matthew Collins of the Met Office Hadley Centre puts this into context: "The rainforest is under many pressures. Direct deforestation is the most obvious immediate threat, but climate change is also a big issue for Amazonia. We have to deal with both if we want to safeguard the forest."

Co-Author Dr Carlos Nobre of the Brazilian Institute for Space Research adds: "Global warming, deforestation and increased forest fires are all acting in synergy to reduce the resilience of the Amazonian forests."

Sulphate aerosol particles arising from the burning of coal in power stations in the 1970s and 1980s have partially reduced global warming by reflecting sunlight and making clouds brighter. This pollution has been predominantly in the northern hemisphere and has acted to limit warming in the tropical north Atlantic, keeping the Amazon wetter than it would otherwise be. Chris Huntingford of CEH, another of the co-authors, explains: "Reduced sulphur emissions in North America and Europe will see tropical rain bands move northwards as the north Atlantic warms, resulting in a sharp increase in the risk of Amazonian drought."

Lead author Professor Peter Cox of the University of Exeter sums-up the consequences of the study: "These findings are another reminder of the complex nature of environmental change. To improve air quality and safeguard public health, we must continue to reduce aerosol pollution, but our study suggests that this needs to be accompanied by urgent reductions in carbon dioxide emissions to minimise the risk of Amazon forest dieback."

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